

I. AMENDMENTS TO THE CLAIMS

Please enter the amendments specified below into the file of this Application. A complete listing of all claims in the Application is provided below along with each claim's status, which is indicated in a parenthetical expression after each claim number. For claim amendments, deleted matter is indicated by strike-out text and added matter is indicated by underlined text.

1. (Currently Amended) ~~In a~~ A lithographic method for forming a pattern in a film carried on a substrate, comprising the steps of:

providing a mold comprising having a protruding feature and ~~a recess~~ recessed feature formed thereby, the protruding feature and the ~~recess~~ recessed feature having a shape forming a mold pattern and providing at least one feature with a lateral dimension of 100 nm or less;

depositing a film on a substrate;

urging the mold into the film whereby the thickness of the film under the protruding feature is reduced and a thin region is formed in the film;

removing the mold from the film; and

processing the relief film whereby the thin region is removed exposing a portion of the surface of the substrate which underlies the thin region; and,

whereby the exposed portion of the surface of the substrate substantially replicates the mold pattern thereby forming a pattern in the film having at least one feature with a lateral dimension of 100 nm or less, and

~~the improvement wherein~~ at least a portion of said protruding feature and a portion of said ~~recess~~ recessed feature have bonded thereto a release material comprising an inorganic linking group bonded to a molecular chain having release properties.

2-41. (Canceled)

42. (Previously Presented) The method of claim 1 wherein the film comprises a material that passes from a flowing state to a non-flowing state during the molding process.

43. (Previously Presented) The method of claim 42 wherein the film comprises a thermoplastic, hardenable or curable material.

44. (Previously Presented) The method of claim 42 wherein the material passes from a flowing state to a non-flowing state upon change of temperature, pressure, polymerization, irradiation or charging.

45. (Previously Presented) The method of claim 1 wherein the film comprises a film layer selected from the group consisting of: polymer film, latex film, viscous polymer coating, composite coating, fusible powder coating, adherent powder coating or fusible powder coating.

46. (Previously Presented) The method of claim 1 wherein the film comprises a moldable polymer.

47. (Previously Presented) The method of claim 1 wherein the film comprises a moldable polymer selected from the group consisting of: acrylates, methacrylates, polycarbonates, polyvinyl resins, polyimides, polyurethanes, polysiloxanes, polyesters and polyethers.

48. (Previously Presented) The method of claim 1 wherein the film comprises metal oxides, metal halides, semimetal oxides or semimetal halides.

49. (Previously Presented) The method of claim 48 wherein the film is a sol.

50. (Previously Presented) The method of claim 1 wherein the film comprises microfibers.

51. (Previously Presented) The method of claim 1 wherein the film comprises a multilayer of films.

52. (Previously Presented) The method of claim 1 wherein the substrate comprises a semiconductor, insulator or metal.

53. (Previously Presented) The method of claim 1 wherein the substrate comprises a single crystal material.

54. (Currently Amended) The method of claim 1 ~~where-in~~ wherein the substrate comprises an amorphous material.

55. (Previously Presented) The method of claim 1 where the substrate comprises a composite material.

56. (Previously Presented) The method of claim 1 where the substrate comprises a multilayer substrate.

57. (Canceled)

58. (Canceled)

59. (Currently Amended) The method of claim 4 51 wherein the pattern formed in ~~transferred to~~ one layer of the a multilayer ~~film~~ of films is used as a mask to pattern the underlying layers in the multilayer ~~film~~.

60. (New) The method of claim 59, wherein the pattern in the mask is more than one layer of the multilayer of films.

61. (New) The method of claim 1, wherein the pattern formed in the film has at least one feature with a lateral dimension of 70 nm or less.

62. (New) The method of claim 1, wherein the pattern formed in the film has at least one feature with a lateral dimension of 50 nm or less.

63. (New) The method of claim 1, wherein the pattern formed in the film has at least one feature with a lateral dimension of 25 nm or less.

64. (New) A lithographic method for forming a pattern in a film carried on a substrate, comprising the steps of:

providing a mold comprising a protruding feature and a recessed feature formed thereby, the protruding feature and the recessed feature having a shape forming a mold pattern;

depositing a film on a substrate, wherein the film comprises a material that is substantially insoluble in organic liquids;

urging the mold into the film whereby the thickness of the film under the protruding feature is reduced and a thin region is formed in the film;

removing the mold from the film; and

processing the film whereby the thin region is removed exposing a portion of the surface of the substrate which underlies the thin region

whereby the exposed portion of the surface of the substrate substantially replicates the mold pattern, and

wherein at least a portion of said protruding feature and a portion of said recessed feature have bonded thereto a release material comprising an inorganic linking group bonded to a molecular chain having release properties.

65. (New) The method of claim 64, wherein the film comprises a hardenable or curable material.

66. (New) The method of claim 64, wherein the film comprises a film layer selected from the group consisting of: polymer film, latex film, viscous polymer coating, composite coating, fusible powder coating, adherent powder coating or fusible powder coating.

67. (New) The method of claim 64, wherein the film comprises a moldable polymer.

68. (New) The method of claim 64, wherein the film comprises a moldable polymer selected from the group consisting of: acrylates, methacrylates, polycarbonates, polyvinyl resins, polyimides, polyurethanes, polysiloxanes, polyesters and polyethers.

69. (New) The method of claim 64, wherein the film comprises metal oxides, metal halides, semimetal oxides or semimetal halides.

70. (New) The method of claim 68, wherein the film is a sol.

71. (New) The method of claim 64, wherein the film comprises microfibers.

72. (New) The method of claim 64, wherein the film comprises a multilayer of films.

73. (New) The method of claim 64, wherein the substrate comprises a semiconductor, insulator or metal.

74. (New) The method of claim 64, wherein the substrate comprises a single crystal material.

75. (New) The method of claim 64 wherein the substrate comprises an amorphous material.

76. (New) The method of claim 64, wherein the substrate comprises a composite material.

77. (New) The method of claim 64, wherein the substrate comprises a multilayer substrate.

78. (New) The method of claim 72, wherein the pattern formed in one layer of the multilayer of films is used as a mask to pattern the underlying layers in the multilayer.

79. (New) The method of claim 78, wherein the pattern in the mask is more than one layer of the multilayer of films.

80. (New) The method of claim 64, wherein the pattern formed in the film has at least one feature with a lateral dimension of 100 nm or less.

81. (New) The method of claim 64, wherein the pattern formed in the film has at least one feature with a lateral dimension of 70 nm or less.

82. (New) The method of claim 64, wherein the pattern formed in the film has at least one feature with a lateral dimension of 50 nm or less.

83. (New) The method of claim 64, wherein the pattern formed in the film has at least one feature with a lateral dimension of 25 nm or less.

84. (New) A lithographic method for forming a pattern in a film carried on a substrate, comprising the steps of:

providing a mold comprising a protruding feature and a recessed feature formed thereby, the protruding feature and the recessed feature having a shape forming a mold pattern;
depositing a film on a substrate; wherein the film comprises a multilayer film;

urging the mold into the film whereby the thickness of the film under the protruding feature is reduced and a thin region is formed in the film;

removing the mold from the film; and

processing the film whereby the thin region is removed exposing a portion of the surface of the substrate which underlies the thin region

whereby the exposed portion of the surface of the substrate substantially replicates the mold pattern, and

wherein at least a portion of said protruding feature and a portion of said recessed feature have bonded thereto a release material comprising an inorganic linking group bonded to a molecular chain having release properties.

85. (New) The method of claim 84, wherein the film comprises a thermoplastic, hardenable or curable material.

86. (New) The method of claim 84, wherein the film comprises a film layer selected from the group consisting of: polymer film, latex film, viscous polymer coating, composite coating, fusible powder coating, adherent powder coating or fusible powder coating.

87. (New) The method of claim 84, wherein the film comprises a moldable polymer.

88. (New) The method of claim 84, wherein the film comprises a moldable polymer selected from the group consisting of: acrylates, methacrylates, polycarbonates, polyvinyl resins, polyimides, polyurethanes, polysiloxanes, polyesters and polyethers.

89. (New) The method of claim 84, wherein the film comprises metal oxides, metal halides, semimetal oxides or semimetal halides.

90. (New) The method of claim 84, wherein the film is a sol.

91. (New) The method of claim 84, wherein the film comprises microfibers.

92. (New) The method of claim 84, wherein the substrate comprises a semiconductor, insulator or metal.

93. (New) The method of claim 84, wherein the substrate comprises a single crystal material.

94. (New) The method of claim 84, wherein the substrate comprises an amorphous material.

95. (New) The method of claim 84, wherein the substrate comprises a composite material.

96. (New) The method of claim 84, wherein the substrate comprises a multilayer substrate.

97. (New) The method of claim 84, wherein the pattern formed in one layer of the multilayer of films is used as a mask to pattern the underlying layers in the multilayer.

98. (New) The method of claim 97, wherein the pattern in the mask is more than one layer of the multilayer of films.

99. (New) The method of claim 84, wherein the pattern formed in the film has at least one feature with a lateral dimension of 100 nm or less.

100. The method of claim 84, wherein the pattern formed in the film has at least one feature with a lateral dimension of 70 nm or less.

101. (New) The method of claim 84, wherein the pattern formed in the film has at least one feature with a lateral dimension of 50 nm or less.

102. (New) The method of claim 84, wherein the pattern formed in the film has at least one feature with a lateral dimension of 25 nm or less.

103. (New) A lithographic method for forming a pattern in a film carried on a substrate, comprising the steps of:

obtaining a substrate;

depositing a film on the substrate;

obtaining a mold of a stiff material which is hard relative to the film, the mold comprising a first protruding feature and a recess formed thereby and a second protruding feature spaced apart from the first protruding feature, the first and second protruding features and the recess having a shape forming a mold pattern and providing at least one mold pattern lateral dimension of 150 nm or less, wherein at least a portion of said protruding features and a portion of said recess have bonded thereto a release material comprising an inorganic linking group bonded to a molecular chain having release properties;

urging the mold at a molding pressure into the film whereby the thickness of the film under the protruding feature is reduced and a thin region is formed in the film, wherein the molding pressure is sufficiently high to transfer the mold pattern to the film and the molding pressure causes a local deformation in the mold which is less than the mold pattern lateral dimension;

removing the mold from the film;

processing the relief whereby the thin region is removed exposing portions of the surface of the substrate which underlie the thin region; and

whereby the exposed portions of the surface of the substrate substantially replicate the mold pattern, including replication of at least one mold pattern with a lateral dimension of 150 nm or less.

104. (New) A method for forming a pattern in a film carried on a substrate, comprising the steps of:

depositing a film on a substrate;

obtaining a mold comprising a protruding feature and a recess formed thereby, the protruding feature and the recess having a shape forming a mold pattern wherein at least one mold pattern lateral dimension is 125 nm or less, wherein at least a portion of said protruding feature and a portion of said recess have bonded thereto a release material comprising an inorganic linking group bonded to a molecular chain having release properties;

urging the mold into the film whereby the thickness of the film under the protruding feature is reduced and a thin region is formed in the film;

removing the mold from the film, the film retaining a relief image thereon from the mold;

processing the relief image whereby the thin region is removed exposing a portion of the surface of the substrate which underlies the thin region; and

whereby the exposed portion of the surface of the substrate substantially replicates the mold pattern, including replication of at least one mold pattern with a lateral dimension of 125 nm or less.

105. (New) A method for forming a pattern in a film, comprising imprinting a mold pattern comprising a first protruding feature, a recess, a second protruding feature, and a release material into the film, wherein the mold pattern comprises a lateral dimension of 150 nm or less.

106. (New) The method of claim 105, wherein the film is coated on a substrate further comprising:

removing the mold from the film; and

processing the imprinted film to expose portions of the surface of the substrate;

whereby the exposed portions of the surface of the substrate substantially replicate the mold pattern, including replication of at least one mold pattern with a lateral dimension of 150 nm or less.

107. (New) The method of claim 105, wherein the release material comprises an inorganic linking group bonded to a molecular chain having release properties.

108. (New) A method for forming a pattern in a film, comprising imprinting a mold pattern comprising a first protruding feature, a recess, and a release material into the film, wherein the mold pattern comprises a lateral dimension of 125 nm or less.

109. (New) The method of claim 108 further comprising:

removing the mold from the film; and

processing the film to expose portions of the surface of the substrate; whereby the exposed portions of the surface of the substrate substantially replicate the mold pattern, including replication of at least one mold pattern with a lateral dimension of 125 nm or less.

110. (New) The method of claim 108, wherein the release material comprises an inorganic linking group bonded to a molecular chain having release properties.